REMARKS

On page 2 of the Action, claims 1-2, 9-11, 13-18 and 20 were rejected under 35 U.S.C. 103(a) as being unpatentable over Willmann et al. (US 5,853,229) in view of Siebert et al. (US 4,730,877).

In view of the rejection, claim 1 has been slightly amended to clarify the structure of the invention.

As cited in claim 1, a brake apparatus of the invention has a service braking system and a regenerating braking system. At least one of the service braking system and the regenerating braking system applies a braking force to wheels upon providing a braking operation.

The brake apparatus comprises a master cylinder for operating the service braking system having an input shaft which travels according to travel of a brake operational member by the braking operation, a master cylinder pressure chamber, and a master cylinder piston which develops a master cylinder pressure in the master cylinder pressure chamber according to a travel of the input shaft; a braking force control device having a pump and controlling, in a service braking operation, a discharge pressure of the pump according to the operational conditions of the service braking system and the regenerating braking system; a controller for operating the pump according to the master cylinder pressure; and a wheel cylinder for receiving the brake fluid at the discharge pressure controlled by the braking force control device and generating the braking force. Upon operation by the controller, the pump sucks brake fluid from the master cylinder pressure chamber and discharges the brake fluid at the discharge pressure controlled by the braking force control device.

In the invention, a travel modulating device has a travel modulating piston to which the discharge pressure at the wheel cylinder is applied, and a modulating spring for urging the travel modulating piston. In providing the same braking force, the travel

modulating piston modulates the travel of the brake operational member in the service braking operation to provide substantially same travel amounts in a braking actuation when the regenerating braking system applies the braking force together with the service braking system and in a braking actuation when the service braking system without the regenerating braking system only applies the braking force.

Willmann et al. discloses a break system of a vehicle with electric drive in which optimum coordination is achieved between the regenerative breaking and the friction break. In Willmann et al., the break system has a master break cylinder 100 with a reservoir 102. Break circuits HZ1 and HZ2 are connected to wheel breaks 104, 106, 108, and 110. The break circuits HZ1 and HZ2 are provided with a pump 136 driven by a drive motor 134. A control unit 200 receives a value representing the break torque produced by the regenerative break and transmits a value representing the breaking torque to be produced. Accordingly, it is possible to coordinate the braking operations including the friction break and the regenerative break.

In Willmann et al., it is stated that if the driver wishes to continue to brake after the storage chamber has become full, brake pressure is built up in the wheels by the friction brake in accordance with the driver's command in addition to the regenerative braking, and thus a superimposed braking action is achieved (col. 4, lines 19-24). Also, it is stated that to shorten the distance the pedal must travel, it is possible for the outlet valves to close when the storage chamber is only partly full, and the pedal does not have to travel as far before the friction brake is allowed to act (col. 4, lines 25-29).

In the invention, the break apparatus is provided with the travel modulating device having the travel modulating piston. In providing the same braking force, the travel modulating piston

modulates the travel of the brake operational member in the service braking operation to provide substantially same travel amounts in a braking actuation when the regenerating braking system applies the braking force together with the service braking system and in a braking actuation when the service braking system without the regenerating braking system only applies the braking force.

In the explanation of column 4, lines 19-29 of Willmann et al., the pedal stroke or travel amount is not considered to be equal in applying the brake, different from the invention. Also, in the invention, the travel of the break pedal is adjusted through the travel modulating device, not by closing the outlet valve as disclosed in Willmann et al. Willmann et al. does not disclose or suggest the break apparatus provided with the travel modulating device. The features of the invention are not disclosed or suggested in Willmann et al.

In Seibert et al., a pressure control valve 12 controls a discharge pressure from a pump 10 according to a master cylinder pressure generated by a master cylinder 1 by pushing a brake pedal 22. The master cylinder pressure switches and controls multidirectional valves 31-34. Thus, the discharge pressure from the pump 10 is supplied to brake wheels 4-7 controlled according to the master cylinder pressure to thereby generate the braking force. At this time, the pedal stroke as desired by a driver is obtained by a stopping distance simulator 37.

The stopping distance simulator 37 is provided in the form of a separate hydraulic cylinder hydraulically connected to the working chamber 19 of the master cylinder. The hydraulic cylinder includes a piston 38 which is displaceable against the force of a restoring spring 39 and, as soon as a pressure-controlled 2-way/3-position valve 40 is switched over to the passage position, is displaceable against the controlled auxiliary pressure prevailing in the pressure fluid conduits 41, 46, 47 (column 4, lines 47-57).

In the invention, the pump sucks the break fluid from the master cylinder pressure chamber and discharges the brake fluid at the discharge pressure controlled by the braking force control device. In Seibert et al., the pump 10 sucks the break fluid from a pressure compensating and pressure fluid reservoir 13, not from the master cylinder pressure chamber.

In the invention, the braking force control device controls a discharge pressure of the pump according to the operational conditions of the service braking system and the regenerating braking system. In Seibert et al., the pressure control valve 12 controls the discharge pressure from the pump 10 according to the master cylinder pressure generated by the master cylinder 1, i.e. increasing pedal force, not according to the condition of the regenerating braking. In Seibert et al., there is no disclosure regarding the regenerating braking.

In the invention, the travel modulating device modulates the travel of the brake operational member in the service braking operation to become substantially the same in a case when the regenerating braking system applies the braking force and in a case when the regenerating braking system does not apply the braking force. In Seibert et al., the stopping distance simulator 37 is used, but it does not constitute the travel modulating device, which modulates the travel of the operational member to become substantially the same in the different braking conditions.

Namely, in the braking system in Seibert et al., the discharge pressure of the pump or the pressure of the accumulator, not the master cylinder pressure, is controlled according to the pushing force of the pedal, and is supplied to the wheel cylinder. This is a conventional braking system. In the invention, the travel modulating device controls the travel of the brake operational member according to the service braking operation and the regenerating braking system.

In Willmann et al., although the regenerative braking and the regular braking are used, the pedal stroke or travel amount is not considered to be equal in applying the brake. In Seibert et al., a pedal stroke or travel is controlled at the time of generating MCY pressure by a pump discharge pressure regulated by a brake force control device at the time of generating the MCY pressure. Even if the cited references are combined, the invention is not obvious from the cited references.

Reconsideration and allowance are earnestly solicited.

A one month extension of time is hereby requested. A credit card authorization form in the amount of $110.00 is attached herewith for the one month extension of time.

Respectfully Submitted,

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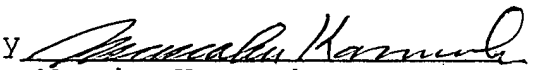
By 
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